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THESIS

THE IMPLEMENTATION OF A KNOWLEDGE MANAGEMENT SYSTEM TO THE ACQUISITION ORGANIZATION AT A MAJOR SYSTEMS COMMAND

by

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THE IMPLEMENTATION OF A KNOWLEDGE MANAGEMENT SYSTEM TO THE ACQUISITION ORGANIZATION AT A MAJOR SYSTEMS COMMAND

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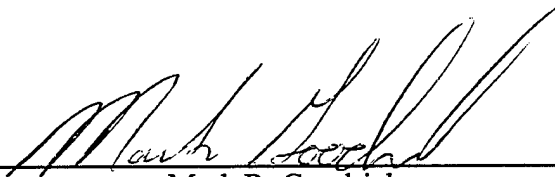B.S., Miami University, 1990

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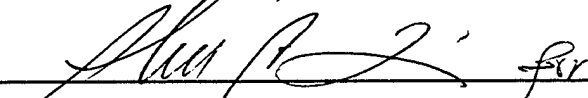## NAVAL POSTGRADUATE SCHOOL
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ABSTRACT

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ACKNOWLEDGMENT

I.   INTRODUCTION

A.   AREA OF RESEARCH

The concept of Knowledge Management within organizations has become a business buzzword for management and information technology gurus starting in the mid-1990's. Corporations have begun to see their corporate knowledge as a valuable commodity that is crucial to the continued success of the organization.

Thomas Davenport and Laurence Prusak, considered pioneers in the field of knowledge management, have stated that despite the rapid influx of technology into almost all private and Government organizations, this technological revolution has not yet found a way to use technology to fully replace the knowledge resident in the human part of their workforce, "Some of the organizations mistakenly assumed that technology could replace the skill and judgment of an experienced human worker" (Ref. 1). This is becoming particularly true as organizations become leaner and smaller, using technology to replace their existing human capital.

Within the acquisition workforce, a large percentage of the contracting specialists within the major systems

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commands, specifically the Naval Air Systems Command, the Naval Sea Systems Command, and the Naval Supply Systems Command, are rapidly approaching retirement age (Ref. 2). The researcher identified and statistically evaluated this problem in an earlier research paper, and concluded that possible solutions to this potential loss of corporate organizational knowledge must be considered and acted upon quickly before the organizations begin to suffer from the loss of this critical resource (Ref. 3).

This research examines the benefits to establishing a knowledge management system and the potential obstacles to successful implementation. Additionally, this research examines the potential corporate and Government entities capable of developing and implementing such a system. This research provides a picture of the system in it's deployed configuration and the feasibility of operating and maintaining such a system.

B. RESEARCH QUESTIONS

The research questions examined by this thesis include the following:

The primary research question is:

How can the acquisition function of a major systems command be enhanced or improved by the development and implementation of a knowledge management system?

The secondary research questions are:

1. What is the background and history of knowledge management?

2. What are the key acquisition processes that could benefit from the implementation of a knowledge management system?

3. What are the gains to be derived from the implementation of a knowledge management system?

4. What are the potential roadblocks to the implementation of a knowledge management system?

5. What corporate or Government entities exist to facilitate the development and implementation of a knowledge management system?

6. How could the developed knowledge management function be applied to other organizations that perform a contracting function?

C.   DISCUSSION – THE NEED FOR A KNOWLEDGE MANAGEMENT SYSTEM

The current acquisition workforce at the major systems commands is rapidly approaching retirement eligibility. Personnel policies and budgetary constraints have prevented the hiring of new members into the acquisition workforce in numbers large enough to facilitate the retention of organizational knowledge to the degree required to maintain continuity of efficient, successful performance. New people hired to replace departing members of the acquisition workforce will be more productive if aided by a knowledge management system that can ease their transition into the workforce. Such a system may help bridge the gap between the explicit information available in published regulations and guidelines and the tacit knowledge usually only garnered from experience gained over a significant period of time. The development of a knowledge management system may prove to be a viable method to retain this organizational knowledge and talent after a large segment of the current

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acquisition workforce leaves Government service; while failing to retain this knowledge will surely erode the corporate base of experience and knowledge that is resident in employees with significant tenure.

An argument can be forwarded that the implementation of the Standardized Procurement System (SPS) may alleviate some of the problems that will result from the large-scale turnover of the workforce. While SPS, in its final state, is expected to assist the workforce with the performance of routine activities, it cannot possibly replace the knowledge and experience possessed by senior employees nor assist in the problem solving for non-routine matters.

D.   SCOPE OF THESIS

This thesis is developed as an implementation guide for the application of a knowledge management system to support the acquisition functions at a major systems command. The main thrust of the research is to examine the possible benefits and drawbacks of the implementation of a knowledge management system and to examine what Government and corporate entities exist to implement such a system. This thesis does not delve into performing a long-term cost and benefit analysis of the implementation of such a system, as

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little historical data currently exists for those organizations presently operating fledgling knowledge management systems. With the exception of answering secondary research question number six, the implementation model is restricted to the contracting organization at a major systems command.

E. RESEARCH METHODOLOGY

In developing this model, the researcher conducts a literature search of books, magazines and credible Internet based sources. The relative immaturity of this technology makes searching the latest materials, including papers and reports by industry leaders, critical to understanding the concept of technology of knowledge management as it emerges and evolves. The researcher also examines existing knowledge-based systems in use in both Government and private industry. The adaptation of an existing system for use in the acquisition organization of a major systems command may prove to be a logical alternative to the development and implementation of an entirely new system.

To assist the adaptation of a knowledge management model to the contracting organization at a major systems command, the researcher reviews the current organization and interviews members of the acquisition workforce with experience understanding both the technology as it evolves

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and the current environment, the implementation should prove to be more successful.

F. ORGANIZATION OF THESIS

The thesis is organized into five chapters. The first chapter serves as an introduction and discusses the scope of the study, the methodology, and the need for a knowledge management system to support the acquisition organization at a major systems command. The second chapter provides background on the field of knowledge management itself. It discusses the roots of the concept and the technology that supports it. Additionally it examines existing corporate and public-sector applications of such a system to provide a more comprehensive understanding of what types of knowledge management systems are currently available. The third chapter executes the research methodology of the paper. It examines the current acquisition organization at a major systems command to show the existing reporting relationships and support structure. Additionally, it discusses the potential benefits in productivity and efficiency to be reaped by the implementation of a knowledge management system and subsequently discusses potential obstacles to the implementation that would hinder its introduction or use

within the organization. These two sections provide an understanding of the feasibility of implementing a knowledge management system within the organization. The fourth chapter outlines a potential alternative organizational structure under the new model and discusses the requirements for system implementation and for system maintenance after the implementation takes place. The fifth and final chapter serves as a conclusion, offers recommendations, and suggests areas for further research.

G. BENEFITS OF STUDY

The largest possible benefit of this study is to be reaped by the contracting organization at the major systems command. The bulk of the acquisition workforce is nearing retirement eligibility concurrent with hiring freezes and delayed or non-replacement of departing workers. This large-scale exodus of the current workforce will have a detrimental effect on the future efficiency and productivity of the organization if the existing body of organizational knowledge is not retained. As new personnel are eventually hired to replace the existing workforce, the systems commands can expect a drop in productivity and efficiency, as these new, relatively inexperienced employees are

expected to fill the positions of long-serving members of the acquisition workforce. Failure to provide a conduit for the transfer of information from one generation to the next may have long-term detrimental effects on the ability of the major systems commands to support their customers. This failure to provide needed contracting and purchasing support may cause large-scale degradations to readiness, war fighting and systems modernization.

This study may also prove useful to the information technology department and senior management of another Department of Defense or other Government agency's contracting organization in developing a blueprint for the implementation of a knowledge management system within their organization. A successful implementation by one such activity may generate interest in replicating the system at other commands, making initial success after implementation even more critical to the sponsoring organization. Should the concept of knowledge management be successfully exported to other organizations and commands within the Department of Defense and other Government agencies, those organizations may expect to reap benefits in the areas of improved communication, efficiency and productivity.

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II. BACKGROUND

A. OVERVIEW OF KNOWLEDGE MANAGEMENT

Knowledge management has been defined in a variety of ways as the concept and the technology behind it have continued to evolve. Perhaps the best definition comes from the Gartner Group, a Stamford Connecticut-based information technology advisory firm. Their definition is:

> Knowledge management promotes an integrated approach to identifying, capturing, retrieving, sharing, and evaluating an enterprise's information assets. These information assets may include databases, documents, policies, and procedures, as well as the uncaptured tacit expertise and experience stored in individual worker's heads. (Ref. 4)

While the Gartner group does an excellent job of providing one definition of what knowledge management entails, it illustrates the collective confusion surrounding the proper definition of knowledge management. Gartner's definition revolves around the management of "information assets" and not true organizational knowledge, a concept which is often much more difficult to grasp. The many various providers and users of this knowledge management technology have tailored other definitions to suit their organizational needs and promote the products they bring to

the market. For example, document management corporations look at the ability to link queries to a folder of pre-existing knowledge as knowledge management, while groupware vendors claim that threaded discussion and communication capabilities are the basis for knowledge management. Additionally, companies that manufacture profiling, search, and agent software to deliver customized information claim to produce the basis of knowledge management. Each of these organizations has a piece of the puzzle to unlocking the benefits and reaping the rewards of knowledge management implementation, but none of them seems to put all of the pieces together in a coherent manner.

Another definition of knowledge management comes from the Alliance of Converging Technologies, A Toronto-based research institution. After engaging in a global study of how businesses are using knowledge to become more competitive, they determined that knowledge management is becoming more central to strategy. Managing Partner Alex Lowy summarized this study with the statement, "You need to be able to innovate ahead of your competition … and offer the best solution at the best price. The ability to create and use knowledge is a major competitive advantage." Lowy feels that successful deployment of knowledge management depends on three things:

1.   Context: Create the right kind of linkage between workers and systems, and give people a meaningful relationship with control over the work they are doing.

2.   Trust: Establish clarity and openness sufficient to allow important knowledge and information to flow freely.

3.   Structure: Design information structures that make it easy for people to take advantage of such things as workflow and storage technologies.   (Ref. 5)

The multiple interpretations of the definition of knowledge management result in very vague requirements for the creation a viable knowledge management system.   The vagueness of these requirements allows more freedom for experimentation and invention on the part of both the vendors of knowledge management and the organizations desiring to implement such a system.   The system can be custom made for each organization or modified from a successful system already in operation supporting another organization.   This flexibility allows the organization seeking to benefit from the implementation of a knowledge management system the maximum amount of latitude in its

implementation. The downside to this nebulous definition of knowledge management is that the term leads to much confusion, because it can be interpreted as any of a number of different systems or tools.

Perhaps the most comprehensible view of knowledge is that it is a valuable organizational asset that is truly useful and productive only when working in harmony with the people of the organization. Knowledge can be effectively managed using information systems that are tailored to meet both the needs of the organization and the requirements of the group's members.

Understanding the life cycle of knowledge management is critical to understanding the process of implementing a knowledge management system. The knowledge management life cycle (KMLC), developed by Nissen, Kamel, and Sengupta of the Naval Postgraduate School, outlines a life cycle that can be broken down into six phases: (1) Create – the first step where the knowledge is captured or harvested. (2) Organize – the step where an early element of structure is applied to the model. (3) Formalize – in this step the knowledge management system becomes more structured in its use and application. (4) Distribute – In this step, the true sharing of knowledge begins. (5) Apply – In this step the knowledge is used and applied to the current organizational

environment. (6) Evolve - In this final step, the system is allowed to grow and develop to meet the changing needs of the organization. Each of these phases is critical to the success of the system when implemented. (Ref.6) This KMLC can be used by organizations to aid their implementation of a knowledge management system.

The sections of this chapter which follow give examples of knowledge management being developed and marketed by both the private and public sector in support of existing public-sector defense organizations.

B.   CORPORATE DEVELOPMENTS OF KNOWLEDGE MANAGEMENT

1.   The Instability of the Modern Workforce

Private-sector organizations have seen an increasingly unstable workforce since the advent of defined contribution pensions (401K plans). This new form of pension benefits replaced the traditional defined benefit plans common since the industrial revolution. In a defined benefit plan, an employee worked for a single employer for a period of years, usually at least 20, and then received a monthly stipend after retirement until death. This process of vesting an employee and then rewarding them after a long career with

one employer was the norm until near the end of the twentieth century. Employees were rewarded for continued service and were incentivized by the pension benefits to stay with one employer for an entire career. Congress' enactment of the defined contribution 401K plan has allowed employees to become vested at a much earlier point in their tenure with one employer. That, coupled with the fact that the employee now has control over the investment of his or her benefits, means the employee can more readily switch employers or career fields without fear of losing accrued benefits.

Previously, employees who switched jobs in the middle of their working years would have feared that the result would have been poverty upon retirement. With this barrier removed, most employees now will find themselves working for far more employers and switching corporations with much more freedom.

Defense firms have suffered more severely from the loss of organizational knowledge resident in their employees. The major defense budget cuts that occurred throughout the 1990's had the effect of exacerbating the amount of corporate restructuring seen in the rest of the private sector. The current Deputy Undersecretary of Defense for Industrial Affairs (DUSD-IA), Mr. Steven Grundman, has

stated that some defense corporations, including Lockheed-Martin, have gone so far as to create blue-ribbon committees to study the problems of lost corporate knowledge and the resultant effects on efficiency, productivity, and the ability to complete challenging organizational goals. (Ref. 7)

Another factor driving the increasing mobility of today's employees is the rising number of women in the workforce. As more women suspend traditional childbearing roles, or allow their children to be cared for during the workday by others, the demographics of the workforce are changing. Women are more likely to enter the workforce after the completion of formal schooling, work for a period of time, and then exit the workforce to have and raise children. (Ref. 8) This exit may be on an either temporary or permanent basis, but its effect is to create more turmoil among the employee base of organizations. Often these departing workers take with them key components of the organizations' corporate knowledge. The development and implementation of a knowledge management system may help allay the loss of this valuable resource.

Additionally, as more households begin to rely on two earners, the transfer of one employee by a corporation may cause the other earner to either relocate within the same

organization or accept a new position at another company. This adds to the level of transition for all workforces. A prime example of this situation can be seen in the school districts located near military bases. Often a large percentage of the teachers will consist of military spouses, most of whom will work only two to three years before their service member sponsor is transferred to a new command in a different geographic area. This loss of knowledge is just one example of how an increasingly transitory workforce can erode an organization's base of knowledge.

2. Private Sector Initiatives

There are several private enterprises actively developing what they believe to be knowledge management systems or the technology to support knowledge management systems. The leading manufacturer and installer of knowledge management hardware appears to be the Oracle Corporation. A search of the Internet websites of many of the leading computer hardware/software manufacturers and document managers, including Dell, Oracle, Compaq, Microsoft, Computer Associates, Netscape, and Xerox, show that they are all delving into the marketing of knowledge management-type systems. Most of these corporations have a

different emphasis on their definition of such a system that plays to their individual corporate strengths.

Oracle Corporation has even gone as far as to retain noted knowledge management guru, Dr. Thomas Davenport of the University of Texas, as a regular contributor to both Oracle's corporate magazine, *Oracle Magazine*, in the areas of knowledge management and to the company's website. Despite Oracle's hiring of this expertise, the company continues to focus on marketing a system that is primarily used for information and database management, rather than the management of true organizational knowledge.

There are non-Government organizations that are already working with the Government on the concept of knowledge management. Some of the more prominent projects include:

a. Global Info Tek Inc.

Global Info Tek, Inc. (GITI) of Vienna Virginia has developed a system called Control of Agent Based Systems (CoABS). CoABS was designed to provide a framework for integration of diverse agent-based systems and to provide common services. The CoABS Grid uses Jini technology and JAVA RMI direct agent communication message queues to allow agent teams to be formed to solve context-based tasks and discover available services. (Ref. 9)

b. University of Southern California Information Sciences Institute

USC has developed a system called GeoWorlds to integrate the World-Wide Web, digital libraries and geographic information systems to allow users to develop a sense of a shared regional vision. All information concerning a specific topic or area can be displayed in one common medium. It allows distributed teams of users to assess information in a collaborative environment and has already been utilized by both civilian and military analysts to solve problems in several geographical regions. (Ref. 9)

c. The Robotics Institute, Carnegie Mellon University

The Robotics Institute at Carnegie Mellon University (CMU) has conducted extensive research into the integration of intelligent agents into human teams. While still in the research stage, the goal is to develop intelligent agents that will enable the seamless integration of information access with user-centered problem solving and decision support; use active/passive monitoring and caching of environmental information so that users can acquire current information; and use intelligent assistants to adaptively form working teams "on-demand" to evaluate and interpret the information requirements of an assigned task. (Ref. 9)

C. PUBLIC-SECTOR APPLICATIONS OF KNOWLEDGE MANAGEMENT

Public sector organizations, and the Department of Defense in particular, are taking an active role in pursuing knowledge management solutions to the problems of constrained budgets and decreasing staff size. As the size of the civil service and military workforce continues to decrease, productivity tools such as knowledge management become more critical to retaining knowledge and experience within the organization and utilizing this information to improve productivity.

Active-duty military units have been continually plagued by the lack of a corporate knowledge base. At sea, most officer tours are only two to three years, with the Commanding Officer and Executive Officer tours averaging only about 18 months. This rapid turnover among the senior leadership of a command causes there to be no one available who was with the unit "the last time" a milestone such as a deployment or a particular inspection was completed. Often the lessons learned from a particular deployment or inspection are either passed down in poorly maintained files, by word of mouth, or not at all. This loss of knowledge causes each command to "re-invent the wheel" repeatedly and to be faced with the same steep learning curve faced by their predecessors a scant two years earlier.

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These lessons are often paid for in extra time, money and workload, and are sometimes paid for in lives. A knowledge management system within a military context could pay huge dividends in the areas of productivity and efficiency.

Some of the more notable projects currently ongoing within the public sector include:

1. Acquisition Reform Office - The Acquisition Reform Office (ARO) is developing a corporate knowledgebase and using institutionalized processes to capture, share and re-use the knowledge held by acquisition professionals. The knowledgebase is built in Livelink and is accessible via a standard web browser. The ARO's goal is to enable cross-program collaboration within a formal, self-sustaining knowledge management system. (Ref: ARO - Kimberly Toone) The ARO has also developed a vision of developing a knowledge management system for sharing knowledge about total ownership costs (TOC) in Navy acquisitions. The goal of this system is to create an interactive knowledge-sharing environment for TOC reduction. While this initiative is just a vision at present, it serves as an example of the corporate initiative being shown by acquisition professionals in the area of knowledge management. (Ref. 9)

2.   Defense Advanced Research Projects Agency – The Defense Advanced Research Projects Agency (DARPA) has developed a knowledge management system called Project Genoa. Project Genoa is designed to identify developing potential crisis situations and then allow a collaborative approach to crisis management and decision making. Project Genoa focuses on the areas of knowledge discovery, structured augmentation and corporate memory within the collaborative environment.

3.   Naval Supply Systems Command – The Navy Supply Systems Command is sponsoring a project called the Business Administration Support Suite (BASS). BASS is an integrated suite of modules that allow for the linkage of documents to allow employees to contribute to the core business processes knowledge base. The suite includes modules for the inclusion of knowledge on the areas of expertise, training, skills, biographies, and other staffed work. (Ref. 9) NAVSUP has also developed an online virtual "bid-room" as part of the Naval Logistics Library (NLL). This site allows the cognizant contracting organization to post and view life-cycle drawings, receive bids on solicitations securely, and make awards to contractors electronically (Ref. 9)

4. **Naval Sea Systems Command** – The Naval Sea Systems Command (NAVSEA) is developing a Business Process Interface Link (BPIL) to share business process improvement practices and experiences across its headquarters and all field activities. The knowledge system is web based and includes best practices as described by the NAVSEA Inspector General, Strategic Sourcing Functionality Assessment information and process re-engineering information. (Ref. 9)

5. **The Center for Army Lessons Learned** – The Center for Army Lessons Learned at Fort Leavenworth, Kansas is sponsoring a program that examines the technology environment in the future to design knowledge based systems that will increase the effectiveness and productivity of both individual soldiers and leaders and the teams of which they are members. It consists of three separate components: the Distributed Laboratory – The Defense Information Technology Testbed, the Distributed Research Center, and the Distributed University which serves as the knowledge center. (Ref. 9)

6. **Space and Naval Warfare Systems Command** – The Navy's Space and Naval Warfare Systems Command (SPAWAR) has developed a knowledge based system to collect, analyze, and

distribute critical command information called CommandNet. CommandNet was developed as part of the Defense Advanced Research Projects Agency's (DARPA) Intelligent Collaboration and Visualization Program. It was developed to enable commanders in a sea-based operational environment to maintain accurate situational awareness in the operational, air, intelligence, and exercise arena. Additionally, CommandNet was successfully tested and employed at sea aboard the USS CORONADO during the Third Fleet's bi-annual exercise RIMPAC 2000, the largest naval exercise in the world. CommandNet allows universal access to shared knowledge, event tracking, and serves as a central repository for storing historical information. (Ref. 9) The Navy's Space and Naval Warfare Command in the National Capital Region is also running a prototype knowledge management system that utilizes some of the latest technologies to support the system. These include WEB Portals, Palm Computing, Action Tracking and Document/Records Management. (Ref. 9)

7. Defense Acquisition University – Defense Systems Management College – The Defense Acquisition University (DAU) is developing an acquisition management system for the Defense Systems Management College (DSMC). This system will

provide on-line learning modules that are linked to DSMC electronic learning materials via an Internet portal. (Ref. 9)

8. United States Marine Corps – The United States Marine Corps (USMC) has developed a system they call K21 – Knowledge for Acquisition in the 21st Century. It is an Internet based application for sharing knowledge between the geographically separate members of the USMC acquisition workforce. It allows acquisition and procurement professionals to submit questions to subject matter experts, refer to bulletin boards on specific issues, and search libraries on specific subject issues. K21 is being deployed to all USMC field activities of the Marine Corps Contracting community. (Ref. 9)

D. CHAPTER SUMMARY

The concept of knowledge management has been seen as a possible cure for the loss of institutional knowledge that results from a transitory workforce. Both the public and private sectors have begun to realize that the knowledge held by their employees is an intangible organizational asset. Retaining, storing and accessing this knowledge is

viewed by many as a key competitive edge for organizations competing in the private sector, and as a way to improve productivity and efficiency within the public sector.

The most effective tool for use in mapping out a path to knowledge management implementation may be the knowledge management life cycle, which allows each organization to tailor a knowledge management system to meet it's own corporate needs for the management of it's knowledge assets.

While there are many examples of ongoing knowledge management systems and designs in existence, there is no single approach to creating and implementing a knowledge management system. Each organization must tailor the available hardware and software into a knowledge management system that suits their own needs for the use of corporate knowledge.

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III.   THE CURRENT ENVIRONMENT AT A SYSTEMS COMMAND AND THE POTENTIAL APPLICATION OF KNOWLEDGE MANAGEMENT

This chapter includes information on the research focus and the research approach as well as background on the current environment within the acquisition organization at a major systems command. It also explores the benefits, obstacles, and feasibility of implementing a knowledge management system within these organizations. This chapter concludes with a summary.

A.   INTRODUCTION

By way of introduction, this section addresses the research focus and research approach of this thesis. The research focus consists of the areas of knowledge management that are reviewed while preparing the thesis. The research approach discusses the variety of sources on knowledge management uncovered during the research itself.

1. Research Focus

The focus of this research is to define knowledge management for those with no exposure into this developing area and to examine the types of knowledge management systems that are available today or being developed

commercially for the near future. A further focus is to examine knowledge management implementation projects that are ongoing at Department of Defense commands. Study of these current projects has exposed some of the obstacles to, and benefits derived from, the implementation of knowledge management systems. Careful consideration of these obstacles and benefits is critical to the ultimate success of the implementation. Failure to fully consider the possible benefits and obstacles of a knowledge management system prior to undertaking the implementation can result in potential problems in the deployment and use of the system once implemented.

2. Research Approach

The research approach centers on the study of web-based reports of current projects and knowledge management conferences. This explosive new field of knowledge management is written about frequently in academia and in industry journals, but the mainstream media is just now discovering it. With few exceptions, most background material on this subject can only be found in recently published journals and articles or via web-based searches of knowledge management organizations and vendors.

The rapid pace of growth in the field of knowledge management has made hardcover books on the subject outdated at the time of printing. One exception to this is Thomas Davenport's *Working Knowledge* (Ref. 1), often regarded as the seminal work in knowledge management. Professor Davenport, now the Curtis Mathes Fellowship Professor and Director of the Information Management Program at the University of Texas, is nearly universally regarded as the guru of knowledge management in a way that is comparable to the manner in which W. Edward Deming is viewed as the father of Total Quality Management (TQM) and process improvement.

To develop an understanding of the current environment within the acquisition organization at a major systems command, the researcher contacts several current and former members of the acquisition workforce at different systems commands and those who oversee policy for these organizations. While each organization faces unique challenges with regard to maintaining and improving the productivity and efficiency of the workforce, there are some common issues raised by representatives from every command. These common, overarching problems are researched and discussed with regard to their impact on the organization both now and in the future.

The potential obstacles to and benefits from the implementation of a knowledge-based system within an organization are derived from the experiences of organizations that have fielded and are operating fledgling knowledge management systems. Some of the potential obstacles can be observed frequently whenever there are fundamental changes in the way an organization conducts its day to day business that is applicable to the implementation of a knowledge-based system at a major systems command.

B. THE CURRENT ACQUISITION ENVIRONMENT AT A MAJOR SYSTEMS COMMAND

Currently, numerous instructions and regulations guide members of the acquisition workforce. The most significant and widely known of these include the Federal Acquisition Regulation (FAR) and the Department of Defense (DoD) 5000 series instruction and regulation. While both have been revised extensively as part of the recent acquisition reform initiatives, when further saddled with the additional instructions and policies imposed by the individual systems commands, they still form a challenging maze of bureaucracy for the members of the acquisition workforce. Learning the applicability and interface between these various instructions, regulations, and other guidance is a time-

consuming and daunting task for new members of the organization. Experience and tenure within an organization is the only current path to truly understanding the current acquisition process.

Discussions with people who have served at major systems commands lead to the consensus that most feel as though the acquisition community is being constrained by an ever-decreasing size of the workforce. The Department of Defense's acquisition workforce has dropped 50% since 1990, from close to 400,000 employees in 1990 to barely 200,000 in 1999 (Ref. 10). As a result, many systems commands have become increasingly dependent upon contractor support services (management, administrative, and professional) to complete their mission. The total cost for these contracted services has grown 54% from 1992 to 1999 (Ref. 11).

Comparison of the available workforce between Naval Systems Commands and comparable commands at the Department of Defense level, including the Defense Logistics Agency (DLA), shows a marked difference in the workforce available in the acquisition environment. The non-Navy activities typically have a far larger workforce available to complete their workload. (Ref. 12, 13)

For example, a detailed study of the contracting billets, those in the GS-1102 series at the Naval Supply

Systems Command (NAVSUP) and their subordinate organizations, shows that the size of the community went from 956 personnel to 634 personnel, a decrease of 34% from fiscal year 1994 to fiscal year 1999. This composite number includes a startling 76% drop in the number of GS-1102 series members in the GS-09 pay grade at NAVSUP.

This is significant as the GS-09 pay grade is widely viewed as a journeyman/worker pay grade where a bulk of the contracting work is likely to be assigned. (Ref. 14)

The workload at major systems commands has decreased for the procurement of supplies and new systems, but has rapidly grown for the procurement of services. Total spending on services for the Department of Defense passed the total spending for goods in 1998, and spending for services alone was $52 billion in 1999. (Ref. 11) As the Department of Defense has drawn down the number of military and civilian positions over the past ten years since the end of the cold war, the number of activities that are now performed for the Government by outside agencies has grown rapidly. (Ref. 12, 13) Additionally, the number of billets filled by active-duty military has shrunk as well. Traditionally, these billets had been in middle and senior level manager positions. As these billets are eliminated or

left unfilled, the workload is shifted to the remaining management group of senior civilians.

Compounding the problem of a shrinking workforce is that existing hiring freezes and the lure of higher paying positions in the private sector as a result of the current economic boom have combined to create a rapidly aging workforce at most systems commands. This workforce is quickly approaching retirement age en masse and the resultant loss of experience caused by their departure is expected to have a profound effect on both the productivity and efficiency of the systems commands. According to Mr. Stanley Solloway, Deputy Under Secretary of Defense for Acquisition Reform, the size of the acquisition workforce has decreased 50% over the last ten years and 50% of the remaining workforce is expected to retire in the next five years. The average age of a member of the present acquisition workforce workforce is 47 and has been rising for the last ten years. Rectifying both the loss of this organizational knowledge and the potential impact on the efficiency and productivity of the acquisition workforce is a primary goal of Mr. Solloway's Acquisition Reform Office. (Ref. 15, 16)

Another factor that has adversely affected recruitment, retention, and productivity at the major systems commands

has been the geographic moves most of them have made over the past several years. The Naval Air Systems Command (NAVAIR) moved to Patuxent River, Maryland from offices closer to Washington D.C.; the Space and Naval Warfare Systems Command (SPAWAR) moved to San Diego from near Washington D.C.; the Naval Supply Systems Command (NAVSUP) moved from Arlington, Virginia to Mechanicsburg, Pennsylvania; and the Naval Sea Systems Command (NAVSEA) is planning to move from Northern Virginia into a new facility at the Navy Yard in downtown Washington D.C. The effect of these geographical moves has been a loss of retention within all areas of the systems commands, including the acquisition workforce (Ref. 14) This problem has also contributed to recruitment problems as well, particularly for those commands (NAVAIR, NAVSUP) that moved from the Washington D.C. area to more geographically remote areas. (Ref. 14, 17) The currently tight job market has made all elements of the job, including relocation and geographic area of the position, critical in the recruitment and retention of qualified personnel.

In order to be identified as a truly successful knowledge management system, the following attributes must be satisfied:

1. The system must exhibit growth in the volume of knowledge content and usage. For example, a quantitative increase in the number of accesses or volume of knowledge held within the repository.

2. The system must possess a high likelihood of being self-sustaining. The project must be an organizational initiative and not an individual one.

3. The organization must be comfortable with the concept of knowledge and knowledge management.

4. The system must exhibit some evidence of returns in improved productivity and efficiency or must display a financial gain for the organization. (Ref. 1)

If there is not a reasonable expectation that these requirements will be met by the implementation of a knowledge management system then there must be additional study of the organization and the proposed system to be implemented before implementation can begin in earnest. It is possible that the current knowledge management technology will not adequately support the organization or perform the desired functions making successful implementation impossible. Additionally, the workforce may require greater training or preparation in order to facilitate the successful implementation.

Knowledge management is not a cure all or panacea for the challenges currently facing the acquisition organizations at the major systems commands, and it should not be marketed or seen as one. Instead, it should be evaluated as one possible solution to the productivity, manpower, and efficiency challenges faced now and into the future.

In summary, each of the systems commands is facing its own unique challenges in accomplishing the mission of supporting the warfighter. The common elements that each of the systems commands face include the impending retirement of a large bulk of the workforce, a robust economy that makes recruitment and retention difficult, and the recent geographic moves of the headquarters of the activity. The decline of size in the workforce coupled with the impending retirement of a large bulk of the workforce mean that each remaining member of the acquisition workforce will be even more critical to the success of their respective organizations in the future. Enhancing the productivity of these employees is essential to the future efficiency and ability of the systems commands to complete their mission. This current environment is one ripe for innovation and change that will enhance the productivity and efficiency of the remaining members of the workforce.

C. THE BENEFITS OF KNOWLEDGE MANAGEMENT IMPLEMENTATION

The implementation of a knowledge management system within the contracting organization at a major systems command may benefit the organization in many ways. A key benefit that any organization can expect to receive is the retention of the knowledge resident within the employees after they retire or leave the organization for positions in the private sector. There is also a benefit in that the temporary absence of a critical member of the organization due to illness or scheduled travel away from the office has less of an impact upon the performance of the remaining employees. The absent employee's knowledge and expertise may still be accessed through the knowledge-based system.

An additional benefit of implementing a knowledge management system will be that it shortens the time required for a new employee to become a productive member of the workforce at the command. The knowledge management system should also benefit the existing members of the workforce, as it will improve their productivity through the sharing of knowledge across disciplines and positions. The Defense Logistics Agency has already developed a generalist type acquisition position by creating the GS-1101 series for civil servants. This new series requires a contracting

specialist to become proficient in the areas of quality assurance, engineering, production management, and other fields before being considered for promotion to the senior leadership positions within the contracting organization. (Ref. 18) Knowledge Management will further promote the ability to share knowledge between this new generation of acquisition workforce generalists.

Another less tangible benefit to the implementation of a knowledge management system is that it displays the commitment of the Navy and systems commands' leadership to re-inventing the work process and the adaptation of new technology. There is a frequent public perception that the Government is a bureaucracy that is slow to respond to technological change. The implementation of a knowledge-based system may prove to be a valuable tool in the recruitment of new employees and the retention of current members of the acquisition workforce in the present economy.

There are potentially several specific acquisition functions that may benefit from the implementation of various knowledge management tools at a major systems command. These include streamlining the source selection process, improving in house market research capabilities and better incorporation of accurate past performance data into source selection evaluation. The positions of negotiators

would be enhanced by the access to details of past negotiations and proceedings. The specific elements of a certain contract or corporation could be more easily reviewed and incorporated with the knowledge of others using knowledge management repositories and an expert network.

The specific knowledge tools that could be employed include computer-based knowledge repositories that would include both structured and informal internal knowledge vital to the performance of members at any level of the organization. Additionally, such a computer-based system would facilitate the rapid transfer of knowledge between employees and aid the training of new members within the organization. Davenport and Prusak advocate a knowledge management system implementation that works along multiple fronts. They include knowledge repositories, expert networks and efforts to create new knowledge. This approach greatly improves the chances for success.

D.   THE OBSTACLES TO KNOWLEDGE MANAGEMENT IMPLEMENTATION

While many of the potential benefits of the implementation of a knowledge management system appear to make knowledge management a panacea for any organization, the implementation will certainly face numerous roadblocks

in its execution. There are several perceived and real obstacles to the implementation of a knowledge management system that must be faced and dealt with before the implementation can meet the requisite factors for success. The most significant of these obstacles is a resistance on the part of more experienced and senior employees to participate in the sharing of their knowledge.

A knowledge management system cannot be successful if the more experienced and knowledgeable members of the organization refuse to participate. Many more experienced and knowledgeable members of the organization may perceive that sharing their knowledge with other members of the organization may weaken their own degree of status or importance within the organization. The perception may be that if a knowledge management system takes the place of their extensive experience and training, then they may become less valuable to the organization or in danger of losing their position within the organization.

Another obvious obstacle to the successful implementation of a knowledge management system is the extensive costs for training on the new system. A large up-front investment of time is required by the employees to facilitate familiarity with the system. This up-front investment in time is critical for the success of the system

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but may be perceived by the workforce as a waste of their valuable time, particularly if they are feeling pressures to complete an acquisition step or are behind schedule on another work-related project.

If members of the organization are uncomfortable with the operation and function of the knowledge management system upon implementation, then they may be reluctant to share knowledge using the system. Members of the organization who were otherwise willing to participate in the sharing of knowledge may become frustrated in their attempts to use the system if not properly trained. The solution to this problem is a commitment from the leadership of the organization to make the up-front investment in training the workforce in the hopes that the training will payoff in terms of increased productivity and efficiency in the long run.

Another potential obstacle to the implementation of a knowledge management system is the potential for far greater interruption to the organization as a result of attempts to penetrate the security of the knowledge management system through the use of viruses or hacking. Hackers and viruses from outside sources regularly attack Department of Defense computer systems now. These attacks, while harmful, have been relatively isolated in nature and have had a minimal

impact on the productivity of any one command. An attack or denial of service on a knowledge management system after implementation could greatly restrict the productivity and efficiency of the organization.   As the members of the organization become more reliant upon the system to perform their day-to-day workload, the impact of a service interruption becomes more profound and significant to the productivity and success of the organization. Even if no files are stolen or data is corrupted as a result of such an attack, the impact of the denial of service while the system is checked could impact the timeline of numerous contracts and programs.

Another significant obstacle to the implementation of a knowledge management system is the restrictions on hiring a contractor for the implementation and continued operation of the system once implemented.   The Secretary of the Navy's instruction governing contractor services (SECNAV INSTUCTION 4200.31C) is entitled Acquiring and Managing Consulting Services and states that management and professional support services can be contracted from private corporations for the purpose of "improved organization of ... examining alternative applications of existing or developing technologies." (Ref. 19)   However, the contracting activity must work with the requiring activity to develop an Operating Plan for the

contracted services that identifies the projected and ongoing contractor service requirements for the present and all future fiscal years. This plan must include a description of the requirement, a justification of the need, the estimated cost of the contracted services and an explanation of why contracted services are needed to satisfy the requirement. A flag or general officer or a civilian member of the Senior Executive Service (SES) must approve this plan.

The SECNAV instruction governing all Navy organizations further states that "A statement of work describing in as clear and unambiguous terms as possible the work to be performed, the deliverable(s), and a specified period of performance." (Ref. 19) The challenge this poses to organizations wishing to develop and implement a knowledge management system is that the requirement or statement of work (SOW) for the contractor is likely to be somewhat vague and undefined until the process and plan for implementation is firmly established. This places the Government organization attempting to implement a knowledge management system in a veritable "Catch-22" type situation in that defining the requirement and statement of work is nearly impossible without the assistance and expertise of an outside contractor while at the same time, an outside

contractor cannot be hired until the requirement is better understood and delineated. This Navy instruction is based on Public Law 102-394 and may be difficult to waive without congressional action.

A better possible resolution to this dilemma is to fragment the requirement into easily defined sections. The organization wishing to implement a knowledge management system may have to break up the entire requirement using the Nissen, Kamel, and Sengupta Knowledge Management Life Cycle Model for implementation as a guide. The organization could then construct one statement of work and draft a contract for the feasibility study of the implementation or creating of the system, construct another statement of work and draft another contract for the organization of the knowledge system, and go through the entire process yet again to allow a contractor to perform the formalization and distribution of the system. Once fully implemented, the organization can then write a more conventional contractor support statement of work and contract for the application and evolution and maintenance of the system. This process, while cumbersome, may prove less challenging than receiving a waiver from Congress or repealing Public Law. The challenge that multiple implementation contracts poses to the organization's contracting officer is the need for

continuity in the face of multiple contracts for which there is likely adequate competition. The contracting officer is faced with either having different contractors performing different parts of the implementation, or deciding to pursue a sole source justification when there are numerous possible vendors. Each of these options has their own inherent risks and liabilities as well.

The recent awarding of a contract to Electronic Data Systems (EDS) to develop and run the Navy-Marine Corps Intranet may serve as a guide for overcoming the obstacles in Public Law 102-394. The development and implementation of a knowledge-based system for a major systems command may be able to use that contract as a blueprint to satisfy both the requirement for contractor support and the law and regulation embodied in SECNAVINST 4200.31C.

Another obstacle to the implementation of knowledge management is the ongoing development and deployment of the Standard Procurement System (SPS). Some members of the acquisition workforce may see SPS as a knowledge management system because it allows repetitive functions to be more automated using information technology. In fact SPS is just a tool for recurring actions and possesses few of the characteristics of a true knowledge management system. True knowledge is not distributed through SPS; it is simply a

document management tool that helps automate the process. The obstacle that SPS presents to the implementation of a knowledge management system is that those making budgetary decisions may view both as the implementation of computer or information technology based acquisition systems. In the current environment for constrained fiscal resources, the funding of another computer-based acquisition system may be a hard sell to those decision makers without the information technology background or experience to understand the difference between SPS and a true knowledge management system. The SPS system has already been funded and deployed to most contracting organizations, making it less vulnerable to the variations of the budget process than a system not yet designed or implemented.

Many of the members of the acquisition workforce in both leadership and working-level positions will expect to reap initial quantum leap in performance, efficiency, and productivity from the implementation of a knowledge management system. Such improvements are possible over time, but the users and leaders must be patient enough to allow the system to evolve and develop to fit the organization and to allow the workforce to use this powerful new tool effectively. Expecting dramatic, instantaneous improvements immediately upon implementation will prove to

be foolhardy. The improvements will come, but early attempts may prove to be discouraging and disconcerting at first. The leadership of the organization must possess the vision and tenacity to continue to pursue the implementation through this challenging early phase.

The obstacles to the successful implementation of a knowledge management system are significant and worthy of consideration and deliberation by those responsible for the implementation. Careful preparation must be undertaken to inhibit the possibility that one of the many obstacles discussed, or as yet unseen ones, do not derail the efforts of the organization conducting the implementation of a knowledge management system. Failure to take into account possible obstacles and deal with them in a proactive and decisive manner will greatly hamper the chances for a successful implementation.

E. THE FEASIBILITY OF KNOWLEDGE MANAGEMENT IMPLEMENTATION

The feasibility of knowledge management implementation is high. There are many factors currently favoring the implementation of a knowledge management system at a major systems command. The first of these is the sense of urgency resulting from the imminent departure of so many experienced, valuable members of the acquisition workforce.

Discussions with both the Deputy Under Secretary for Defense for Acquisition Reform Stan Solloway, and the Assistant Deputy Under Secretary of Defense for Industrial Affairs indicate that those within the highest levels of the Department of Defense are aware of the problem and are considering the use of a knowledge based system as at least a partial solution to the problem. (Ref. 7, 15)

An additional impetus that promotes the feasibility of implementing a knowledge management system is that the technology has evolved to the point where knowledge management is no longer considered an experimental or developmental technology. The Department of the Navy hosted a Knowledge Fair on August 1, 2000 in Arlington Virginia, which allowed Government and private entities to exhibit and display their projects and systems to other interested parties. This fair was hosted by the Under Secretary of the Navy and coordinated by the Navy's Chief Information Officer. The fair attracted 66 different exhibitors representing knowledge management users and vendors from Government, academia, and the private sector and was attended by members of many Navy and other Department of Defense organizations. While not of all of the exhibitors could be considered to be developing or implementing true knowledge-based systems, the exposure this event provided to

knowledge management served to better educate the Navy's decision makers about the technology and concepts of knowledge management. This fair, which was the first of its kind for the Navy, illustrated the maturity of knowledge management technology and its explosive growth within the public sector.

Successes at other organizations illustrated at the Knowledge Fair and those written up in mainstream media serves to further enhance the position of knowledge management within the corporate and Government culture and make the feasibility of implementing a knowledge-based system a stronger possibility.

In the Knowledge Management Life Cycle described earlier, an organization wishing to implement a knowledge management system has a blueprint to guide their steps in implementing a knowledge-based system for their organization. While the expertise for performing such an implementation is surely more prevalent in the private sector than within Government, the ability to find a competent contractor for the implementation of such a system is no longer a roadblock to successful implementation. Implementation of a knowledge management system is feasible given the organization's commitment to the success of the system and adequate funding to hire the requisite expertise.

F. CHAPTER SUMMARY

There are many potential obstacles to the successful implementation of a knowledge management system within the contracting organization at a major systems command. These obstacles include competing systems, funding, resistance to change on the part of members of the workforce, and the threat of disruption of the system caused by hostile entities from outside the organization. These obstacles however, can be overcome. The feasibility of and benefits to be derived from implementing a knowledge management system are very high. At present, the rapid maturation of the requisite technology, coupled with the sense of urgency as a result of the imminent departure of a large percentage of the contracting workforce, makes this an optimal time to undertake the implementation of a knowledge-based system within the contracting organization at a major systems command. A decision to delay implementing a system at this time runs the risk of doing so after the large bulk of the organization's knowledge has retired. The time is right to implement a system to capture and use this knowledge now.

IV. KNOWLEDGE MANAGEMENT SYSTEM MODEL

A. ORGANIZATIONAL STRUCTURE UNDER THE MODEL

The organizational structure of the acquisition department at a major systems command, after implementation of a knowledge management system, may either remain the same or be radically changed, with the likely end state probably somewhere in between. Nearly all of the systems commands and the Defense Logistics Agency have undergone significant restructuring of their organizations in the past five years. These organizational restructurings have taken place as a result of downsizing (e.g., in the case of NAVAIR, NAVSEA, and NAVSUP), mission changes (e.g., in the case of NAVSUP), or in the effort to improve productivity and efficiency.

The benefit that these restructuring efforts bring to the implementation of a knowledge management system is that long-serving employees are acclimated to restructuring as a regular occurrence within their workplace. The fear that restructuring often brings to the workforce at private corporations is not as prevalent within the Department of Defense workforce. The rapid turnover of military personnel, particularly those serving in senior leadership positions, makes organizational change inevitable. Its

repeated occurrence has made the employees less resistant to change and possibly more willing to embrace any organizational structure changes required by the implementation of a knowledge management system.

The key factor advocated by both change management experts and knowledge management gurus is the commitment of the top leadership of the organization to the success of the implementation. The organization must set up a separate division or department to facilitate the implementation that has a direct reporting relationship to the senior leadership within the organization.

The process of implementation must actively engage the members of the workforce expected to use the system. Doing so will encourage buy-in from the end users and improve the project's ability to succeed. The end-user should be involved in assisting the implementation from the development phase. This will allow the system to be customized with functions and features that will better fit the needs of the workforce. Developing and implementing a system without the input of the users of the system will both create hostility towards the implementation project and result in a sub-optimal final system.

Several of the systems commands, most notably SPAWAR, already have large information technology or information

systems departments, making this a likely home for the knowledge management implementation team to reside. The director of the implementation must have unabated access to the command's senior leadership, both to help clear organizational obstacles to implementation and to demonstrate the organization's commitment to the successful implementation.

The director of the implementation project must also be tasked with tracking the metrics outlined by Davenport and Prusak and paraphrased in chapter three of this thesis. Notably, the project director must track and report to senior leadership the following:

1. The growth of the system over time as measured by knowledge content and usage, number of accesses for knowledge or the volume of knowledge within the repository. Senior leaders should expect this to be an upward trend over the life of the implementation project.

2. The system must appear to be self-sustaining for the life of the organization and not be seen as an individual initiative. While this is a nebulous concept to track, the senior leadership must be convinced that the system is becoming an ingrained part of the organization.

3. The organization must be comfortable with the concept of knowledge and knowledge management. This can be measured objectively through the use of employee surveys and by observing employee interaction with the system. It can also be measured subjectively at employee training sessions when the concepts of organizational knowledge and knowledge management are discussed.

4. The system must also show some return on the resources invested, both time and money, in it. These returns should be in the form of increased efficiency and productivity and may be measured objectively in the form of decreased Procurement Average Lead Time (PALT), decreased overtime on the part of acquisition employees, or a decrease in the number of contracts and solicitations created with errors.

The success of the project can be evaluated based on how well the project satisfies the requirements outlined above. By measuring these items on a periodic basis the senior leadership can discover early if any of the obstacles discussed in chapter three are impeding the success of the

implementation project and deal with these obstacles before they become to formidable.

A desirable end state may be that visualized by KPMG in their vision of knowledge management:

> A business model embracing knowledge as an organizational asset to drive sustainable business advantage. It leverages intellectual capital through an integrated approach to create, share, and apply knowledge. (Ref. KPMG)

B.   SYSTEM IMPLEMENTATION AND MAINTENANCE

An outside contractor will likely conduct the system implementation. While there are numerous possible methods for implementation, the implementation model will likely take the form similar to one of the more well-known life cycle implementation models. The most common of these are those proposed by the Gartner Group, Davenport and Prusak, and Despres and Chauvel. For the purpose of this thesis, I assume that the implementation will be based on the model developed by Drs. Mark E. Nissen, Magdi Kamel, and Kishore Sengupta of the Naval Postgraduate School.

Their model proposes six distinct phases for the implementation and life of the knowledge management system. These are creation, organizing, formalizing, distribution,

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application, and evolving. In the creation phase the data is mined and harvested from the organization. In the organization section the early elements of structure are applied to the model. In the formalizing phase, the knowledge management system becomes more structured in its use and application. In the distribution phase the true sharing of knowledge begins, and in the application phase the knowledge is applied to the current organizational environment. In the final phase of evolving, the system is allowed to grow and meet the needs of the organization.

In the applied knowledge management system, the creation phase will involve the solicitation of knowledge from the employees of the organization. The organization must decide the content of the knowledge to be harvested and its relative value to the organization. Involvement from both senior leadership and employees is critical to the success of the system at this phase as they are the eventual users and operators of the system. They must be involved in determining the relative value of the knowledge to the organization.

The next phase is to encourage employee involvement with the implementation project team to determine the structure of the organization's knowledge management model before entering the formalizing phase when the structure is

applied to delineate the final structure, its use and application. Once again the input of the final users is critical to deciding the structure of the system. The system architecture must be easily used and understood by the end-users to be effective.

The distribution phase is when the first real fruits of the project begin to be observed. It is following the initial contact of the deployed system with the acquisition workforce that many of the obstacles discussed earlier begin to emerge. Early identification of these potential project roadblocks is a key to successful implementation.

In the final phase, evolution, continued project evaluation on the part of users and senior leadership is critical to the development and improvement of the system. The initial system will almost certainly not meet the complete requirements of the organization. Therefore, a determined, and regular process of evaluating and improving the system is necessary to fulfill the full potential of the system.

According to the Project Executive Office for Acquisition Related Business Systems [PEO(ARBS)], each organization implementing a knowledge management system needs to decide the following items:

1. What information do we want to share?

2. Who do we want to share it with?

3. When do we want to get the information (push, pull, just in time)?

4. Where does the data come from (knowledge workers, other databases, etc.)?

5. How do you use data to make decisions (pictures, numbers, etc)?

These questions must be answered by the senior leadership of the organization working in close concert with the users of the system. Understanding the organization's views on each of these questions is critical to formulating the implementation plan.

C. SYSTEMS COMMAND EXAMPLE

Once implemented, the systems command operating a knowledge management system should expect fundamental changes to the way their business is conducted. As the employees become increasingly more familiar and comfortable with operating the system, the organization can expect new lines of communication, new relationships between divisions and departments and new supervisory roles to emerge.

The existing system should operate as a knowledge repository for the organization and should be accessed using desktop and portable laptop units for convenience. The introduction of artificial intelligence (AI) to the system will further enhance system performance. The system architecture and query functions should be customized using user's input to allow easy access to the organization's existing knowledge through the use of keywords and prompts, and should also allow the seamless and transparent collection of knowledge to help grow the repository.

The organization's knowledge objectives will be measured qualitatively through the analysis of user satisfaction with the system. Additionally, the system should monitor the quantitative volume of user activity to determine when the organization's knowledge goals have been achieved.

Specifically, the organization should be able to use the implemented knowledge management system as an expert system to revolutionize the way they perform several existing processes and functions.

These fundamental changes may include a change to the existing source selection process. Using the knowledge management system may improve communication between members of the source selection evaluation board, allow easier

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access to evaluation data, past performance data, and information on previous source selection processes. The knowledge itself will be pushed to the users and will be more integrated than the current system, which is largely paper-based.

The market research process may be altered dramatically as well. The knowledge management system could be tailored to continually track market conditions, trends, and prices for different industries. Using both AI and integrated computer-based Internet searching to evaluate and track data on the market would be more efficient and effective than the current process. This would permit employees to access this information in conjunction with internal market information to conduct comprehensive market research more completely and efficiently.

The modification of contracts could be improved by the application of a knowledge management system. The system would allow access to a repository of past modifications and logically link them to follow-on problems or solutions that resulted from the issuance of similar modifications. This will be an improvement on the current vision of SPS, which simply provides a template without incorporating the knowledge gained through previous iterations of the same process.

The legal department could benefit from the implementation of a knowledge management system as well. Actions to be taken on a proposed or present contract could be queried through a database system using keywords, corporate names, or contract identification data by the contracting employee to determine similar past situations that resulted in protests or disputes. This data recall would then be presented in an integrated database management system (DBMS) format with related legal precedents and allowing a legal opinion concerning more routine situations to be formed without direct consultation with an attorney. Legal opinions are best served through an expert system as a result of their greater degree of knowledge and sophistication required. This would allow the organization's employees to draft better contracts with a lower risk of sustainable protest or dispute.

One of the possible difficulties in the operation of a knowledge management system is the temptation of senior leadership to micro-manage the actions of the workforce. The rapid flow of knowledge and information between members of the workforce makes this information far more accessible to all members of the organization with the proper access. Managers might be tempted to delve into issues or try to solve problems before lower level supervisors are given an

opportunity to rectify the situation. This can only be fixed through training and time using the system.

Another possible difficulty that might arise is the inability to link the system to people outside the organization who have a need to access the knowledge resident within the system. This might include outside testing organizations, customer commands, or approving officials outside the systems command. The inability to communicate and share knowledge with these outside agencies will require the systems command to incur an additional administrative burden in converting the requested knowledge into a format that can be used by the outside agency.

The organization must be unwilling to "rest on its laurels" once it appears the implementation is succeeding. Further technological improvements and increasing organizational reliance on the system make continued improvement and expansion of system capabilities a requirement for ongoing success for the system in the future.

D. CHAPTER SUMMARY

The implementation of a knowledge management system, whether performed by a Government agency or by a private contractor must follow a logical plan such as that proposed

by Drs. Nissen, Kamel, and Sengupta or the implementation has little chance for success. Additionally, the implementation must be both supported and closely monitored by the senior leadership in the organization to facilitate success. This senior leadership commitment is critical to both help clear potential obstacles to successful implementation and to demonstrate the commitment of the organizations' top leadership to the success to the project.

The senior leadership, working with the actual members of the acquisition workforce, should endeavor to answer the questions of what information is to be shared, with whom, and how it will developed, displayed and retrieved.

Answering these questions and following a plan as outlined in a knowledge management life cycle model will greatly enhance the chances for successful implementation.

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V. CONCLUSIONS AND RECOMMENDATIONS

A. CONCLUSIONS

The current environment within the Department of Defense and the acquisition community as a whole is ripe for large-scale, fundamental changes in the way the Government's business is conducted. The ongoing revolution in military affairs and revolution in business affairs within the Department of Defense has created an environment and culture that is more conducive to finding new, revolutionary ways of doing business than ever before. Public statements by leaders within the Defense acquisition field have widely echoed and supported this sentiment.

The challenges faced by the current leadership of the acquisition community include a smaller workforce, an increasingly less stable workforce, and the imminent retirement of a large segment of the current employee base. While knowledge-based systems cannot be viewed as a cure-all for each of these difficult challenges, they do serve as a possible partial solution that holds real promise for the future.

The brief history of knowledge-based systems demonstrates the potential for dramatic improvements in

productivity, efficiency, and organizational effectiveness that a cohesive knowledge management system can potentially bring to any organization. The possibility of high future payoffs for an acquisition organization from a knowledge management system makes the further investigation and investment in the pursuit of a knowledge-based system a necessary and viable choice.

In a recent speech at the Naval Postgraduate School, the current Deputy Under Secretary for Defense for Acquisition Reform, Mr. Stan Solloway, said, "Intellectual property is the family jewels of a corporation." (Ref. 15) This statement helps demonstrate the value placed on retaining and using the knowledge resident within Department of Defense acquisition organizations. A viable way to retain that knowledge is through the use of knowledge-based systems that can serve as repositories of the organization's knowledge after the loss of key employees.

The additional possible benefits of knowledge-based systems include the ease in training new members of the organization, and to assist the maintenance of continuity through the current and future periods of turnover within the organizations. The adoption of a knowledge management system for an acquisition organization also demonstrates to both employees and those outside the organization that the

acquisition workforce is committed to using the latest technology and methods to attract and retain a technologically savvy workforce and to aid in the productivity of that workforce.

The obstacles to success outlined in chapter three of this thesis are numerous and significant. They are not, however, insurmountable. The knowledge management life cycle proposed by Drs. Nissen, Kamel, and Sengupta of the Naval Postgraduate School provides a realistic and usable roadmap for a successful implementation. A commitment by the leadership of the organization, both in ideology and in funding, provides the requisite support for the program to succeed.

The introduction of a knowledge management system to the acquisition organization at a major systems command cannot be expected to solve all of the challenges currently faced by the organization or alleviate all future problems. It does, however, provide a potential tool for solving or minimizing many of the issues currently hampering the success of these organizations.

B.   RECOMMENDATIONS

There are several recommendations to be made with regard to the introduction of a knowledge management system at a major systems command. The first of these is that one such system be contracted for and developed as a pilot project for implementation. The Space and Naval Warfare Systems Command may be the obvious choice for such a program. It already possesses an organic information technology department (Ref. 20) and has a more extensive background in the procurement of computer technology and software than do the other major systems commands.

Another recommendation is that any widespread deployment of a knowledge-based system should be based upon a common architecture and system for use at all of the systems commands. This configuration will aid the future transfer of personnel and knowledge between these commands. A common configuration will also allow the systems commands to take advantage of common training facilities and perhaps achieve reductions in total deployment cost through improved economies of scale in the procurement.

This system deployment may eventually extend to include the contracting activities outside the major systems commands. Such commands might include Fleet and Industrial Supply Centers (FISCs), construction type contracting

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commands operated independently by the Civil Engineer Corps, the Defense Contract Management Agency, and possibly even those contracting commands operated by other services.

The evolution and deployment of the Standard Procurement System (SPS) may facilitate the inclusion or merger of SPS with a mature knowledge-based system. There are some probable synergistic effects resulting from the adaptation of SPS with a knowledge-based system. The system would eventually allow the routine tasks to be performed by SPS while using the knowledge-based system as an integrated part of the process for more complex tasks. This homogeneous, composite system would give the employee far greater flexibility than operating each system on a stand-alone basis, thereby forcing the employee to perform the link between SPS and the knowledge management system.

An additional benefit to the adaptation of the knowledge-based system to the mature version of SPS is the issue of funding. Tying the future versions of SPS to the incorporation of a knowledge-based system would provide a more stable funding base for both systems and allow a better possibility for the systems commands to field both systems successfully.

A further recommendation is to fully educate the leadership of major contracting organizations about the

nature and possibilities created by the use of knowledge-based systems. Discussions with, and writings by, members of the leadership of the acquisition workforce demonstrate that there is a wide variance in the amount and depth of knowledge on the subject on the part of senior leadership. Successful implementation will require a cohesive understanding of the abilities and limitations of a knowledge-based system on the part of senior leadership.

C. SUGGESTED AREAS FOR FURTHER STUDIES

There are several possible areas for further study with regards to the areas of knowledge management and its application to the acquisition process. While much has been written on the subject already, there is still considerable room for further study.

Specific topics include the adaptation of knowledge management to the Standard Procurement System. The benefits from and obstacles to the merger of these two different systems is a subject that may prove instrumental to the eventual success of both programs.

Other topics for further study include the development and degree of training required for the deployment of a knowledge-based system for the organization. Deciding what information must be imparted and the degree of initial and

refresher training required is critical to the ultimate success of the implementation.

Another area of study would be the interface of a knowledge-based system with other areas of the systems commands. This would include the interface with the test and evaluation communities, the program management offices, and the comptroller departments.

A final large area of study would include the viability or necessity of a link between the mature knowledge management system within the contracting organization at a major systems command and the yet to be deployed Navy Marine Corps Intranet (NMCI). While such a study may appear to be farsighted, the rapid development of both projects encourages the early discussion of possible overlapping needs and requirements.

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